

## DOOR STRUCTURAL BODY

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### Abstract

**PROBLEM TO BE SOLVED:** To eliminate undesired projection of a handle part eventually worsening appearance, difficulty in holding it and uncertainty in strength thereof concerning a door of a refrigerator and help saving energy by increasing a heat insulating thickness to backup a recessed portion.  
**SOLUTION:** Numeral 1 indicates the body of a refrigerator and 15 a pullout type door structural body. A handle part 19 is formed in a box with a protruding part 20, a right and left separating part 21, a rear rib shape 22 and a top surface cap part 23.

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**(57) [Abstract]**

**[Aim]** The present invention aims to eliminate the undesirable projection of a handle inviting a decline in the external appearance of the refrigerator door, and aims to solve the problems of "uncertainty in the strength" and "hard to grip" handle by means of backing up the concave unit, and by means of increasing the adiabatic thickness at the central area, as the measure to low energy consumption.

**[Solution]** The reference numeral 1 indicates the main body of a refrigerator. The reference numeral 15 denotes a pullout drawer type door structure. A handle unit 19, a convex unit 20, a right and left partition unit 21, a rear plane rib 22, and a roof cap unit 23 altogether form a box shape.

**[Scope of the Patent Claims]**

**[Claim 1]** A door structure having a pullout drawer type door of the refrigerator, cap doors installed at upper side and lower side of the door, and a panel door sandwiched between the cap doors: comprising; a convex unit installed at the central portion of the upper side cap door at its front lower portion; a partition unit formed in a circular convex shape; and a handle unit surrounded by the convex unit, the partition unit, and a rear plane rib, wherein the handle unit is only its central portion;

wherein the handle unit is formed together with a central concave unit of the panel door close to the rear plane rib.

**[Claim 2]** A door structure having a pullout drawer type door of the refrigerator, cap doors installed at upper side and lower side of the door, and a panel door sandwiched between the cap doors: comprising;

a handle unit of the central portion of the upper side cap door; a partition unit on both sides of the handle unit, formed by molding together with the handle unit; and a rear plane rib, wherein a circular convex shaped handle unit and right and left partition unit, the rear plane rib, and a roof cap unit are molded together in a box shape, in order to obtain a definite strength.

[Claim 3] A door structure having a pullout drawer type door of the refrigerator, cap doors installed at upper side and lower side of the door, and a panel door sandwiched between the cap doors: comprising;  
a handle unit at the central portion of the upper side cap door;  
a concave unit formed by making the central portion of the panel door the convex shape; and  
a central convex unit of the upper and lower cap doors, which is made in the likewise manner as the central convex shape of the panel door.

[Claim 4] A door structure having a pullout drawer type door of the refrigerator, cap doors installed at upper side and lower side of the door, and a panel door sandwiched between the cap doors: comprising;  
a handle unit at the central portion of the upper side cap door;  
a concave unit formed at a frontal plane of the handle unit; and  
an escutcheon is formed at the concave unit as another object.

[Claim 5] A door structure having a pullout drawer type door of the refrigerator, cap doors installed at upper side and lower side of the door, and a panel door sandwiched between the cap doors, wherein a fitting unit of the cap doors and the panel door comprises;  
a front rib of the cap door at its frontal plane; and  
a back rib of the cap door at its lateral plane, having shorter height than the front rib;  
wherein the front rib and the back rib of the cap door sandwiches the panel door.

[Claim 6] A door structure having a pullout drawer type door of the refrigerator, cap doors installed at upper side and lower side of the door, and a panel door sandwiched between the cap doors, wherein a fitting unit of the cap doors and the panel door comprises;  
a front rib of the cap door at its frontal plane;  
a back rib of the cap door at its lateral plane, having shorter height than the front rib; and  
a guide rib formed perpendicular to the back rib;  
wherein the front rib and the back rib of the cap door sandwiches the panel door.

[Detailed Description of the Invention]

[0001]

[Industrial Application] The present invention relates to the door structure of a domestic refrigerator for home use.

[0002]

[Related Art] Conventionally, as disclosed in Japanese unexamined patent publication HEI6-159916, making of the high-grade quality refrigerator is a prerequisite for maintaining the simple external appearance by emphasizing a uniform appearance, and by removing outwardly protruding handle.

[0003] Hereinafter, the door structure of the conventional refrigerator mentioned above is explained with reference to the attached drawings.

[0004] The drawing of Fig. 6 shows the oblique view of the refrigerator of the conventional example.

The drawing of Fig. 7 shows the oblique view of the refrigerator door structure. The reference numeral 1

denotes a main part of a refrigerator. The reference numeral 2 denotes a pullout drawer type door. The reference numeral 3 denotes the handle attached in the central portion of the door.

[0005] Moreover, the drawing of Fig. 8 shows the cross section of the door structure. The reference numeral 4 denotes an upper side cap door. The reference numeral 5 denotes a lower side cap door. The reference numeral 6 denotes a panel door. The reference numeral 7 denotes an urethane adiabatic material. The reference numeral 8 denotes a seal member.

[0006] Explanation regarding how the door of the refrigerator constituted as mentioned above function follows below.

[0007] Generally, the following features must be taken into account in regard to a handle of the door structure of the refrigerator. Easy grip door handle, anti-sweat adiabatic property, the need of considering the drawer intensity to support the load of food products, and easy recognition of the handle unit by accenting it. Moreover, in regard to processability and workability upon manufacturing of the door, it is indispensable to consider the seal property to avoid a leakage of the adiabatic material (urethane) of the upper and lower cap doors and the front panel door. It is also important to consider the workability upon inserting the panel door in position.

[0008] Therefore, on the external appearance design, in regard to the pullout drawer type door structure, the upper side cap door 4, the lower side cap door 5, and the handle unit 3 constitute it. The handle unit 3 and the upper side cap door 4 are molded together as one body. Only the central portion of the cap door 4 is made into a convex shape to allow a space in between with the panel door 6 to provide a space to set the hand.

[0009] Moreover, in regard to the sealing property, besides the upper side cap door 4, the lower side cap door 5, and the panel door 6, an another seal member 8 is required. The upper side cap door 4 and the lower side cap door 5 and the panel door 6 need the glue work to the front ribs 9 and 10 of the upper side cap door 4 and the lower side cap door 5 at the time of assemblage.

[0010]

[Problems to be solved by the Invention] However, with the above structure, it could be hard to emphasize the appearance design of the handle unit. In addition to that, the front plane rib of the cap door becomes too high in order to secure the extent of finger placement. This has caused a decline in the external appearance.

[0011] In addition to that, since the plane of the handle unit spreads out to the right and left, this plane is weak in strength, and may have bent if it is being pulled strongly. At the concave unit of the handle unit of the panel door, the amount of heat absorption may have increased, and it goes against the low energy consumption.

[0012] And there is a problem of difficulty in recognizing whereabouts the handle is in the refrigerator since it emphasized the uniform appearance too much.

[0013] In addition to that, a seal member is required during the door assembly operation, for preventing leakage of the urethane adiabatic material. And this has resulted in the technical problem when of the panel door is being inserted to the cap door.

[0014] The present invention is made in view of the above-mentioned technical problems, taking into consideration the following features. The present invention aims to supply a door structure having secured the extent of finger placement on the handle unit, strong intensity, improvement in the adiabatic property, emphasizing of the handle unit, simplifies workability of the seal, and the high-speed assembly operation.

[0015]

[Means for Solving the Problem] In order to solve the above-mentioned technical problems, according to the present invention, the handle unit of the door structure is projected at a lower frontal part, and at a back of the convex circular projected part, the right and left partition unit and the rear plane rib are formed, altogether forming a box shape. The central convex unit is formed at the right and left handle unit of the door structure.

[0016] In addition to that, the handle unit installs a concave unit at the frontal plane and an escutcheon is formed at the concave unit as another body. The panel door and the cap door are made into a sandwich structure by the front and back ribs, and a guide rib is also constituted.

[0017]

[Process] According to the present invention as defined in claim 1 it consists of a pullout drawer type door of a refrigerator, the upper and lower side cap doors, and a panel door which is put between the upper and lower side cap doors. A convex unit is formed at a frontal plane of the cap door surface facing a lower direction. A right and left partition unit is formed in convex shape. The central portion surrounded by the convex portion, the right and left partition unit and a rear plane rib is the handle. The central concave unit of the panel door close to the rear plane rib configures the handle unit. Because the handle unit is projecting in the frontal lower direction, it is easy to set a hand there. Also, the handle is easy to grip and allows opening operation of the drawer door firmly.

[0018] According to the present invention as defined in claim 2 it consists of a pullout drawer type door of a refrigerator, the upper and lower side cap doors, and a panel door which is put between the upper and lower side cap doors. A convex circular shape is formed at the central portion of the upper side cap door. A partition unit is formed on both sides of the handle unit by means of molding together with the upper side cap door. A rear plane rib is formed. The door structure having a definite strength is obtainable by molding together the convex circular shaped handle unit, the partition unit, the rear plane rib, and a roof cap unit. Because of the box-shape of the convex circular shaped handle unit, the partition unit, and the rear plane rib, it is easy to recognize the handle. It is also effective in providing user the sense of security owing to the firm strength without the handle unit being bent upon opening.

[0019] According to the present invention as defined in claim 3 it consists of a pullout drawer type door of a refrigerator, the upper and lower side cap doors, and a panel door which is put between the upper and

lower side cap doors. The door structure is constituted from the handle unit formed at the central portion of the upper side cap door, the concave unit formed by making a convex shape at the central portion of the panel door, and a central convex unit of the upper and lower side cap doors in the similar manner as the central convex shape of the panel door. Because of the convex-shape of the central panel door and the central cap door, the thickness of urethane adiabatic material is increased, and effectively reduces heat absorption and conserves energy.

[0020] According to the present invention as defined in claim 4 it consists of a pullout drawer type door of a refrigerator, the upper and lower side cap doors, and a panel door which is put between the upper and lower side cap doors. The door structure is constituted from the handle unit at the central portion of upper side cap door. A concave unit is formed at the frontal plane of the handle unit. An escutcheon is formed at the concave unit as another object. By having formed the concave unit in the handle unit and by having constituted the escutcheon as another object, the external appearance is improved, and the handle unit is emphasized, and able to carry out opening and closing operation of the door without holding onto other portions.

[0021] According to the present invention as defined in claim 5 it consists of a pullout drawer type door of a refrigerator, the upper and lower side cap doors, and a panel door which is put between the upper and lower side cap doors. In regard to the fitting unit of the cap door and the panel door, a front rib of the cap door is formed at the frontal plane, and a back rib is formed at the back plane, which is lower in height than the front cap door rib. The door structure has the sandwiched structure using the panel door and the front and back ribs of the cap door. Because of this method of sandwiching the panel door using the front and back ribs of the cap doors, it is effective in losing a seal member and improving assembly operation.

[0022] According to the present invention as defined in claim 6 it consists of a pullout drawer type door of a refrigerator, the upper and lower side cap doors, and a panel door which is put between the upper and lower side cap doors. In regard to the fitting unit of the cap door and the panel door, a front rib of the cap door is formed at the frontal plane, and a back rib is formed at the back plane. A guide rib is prepared perpendicular to the back rib. The door structure has the sandwiched structure using the panel door and the front and back ribs of the cap door. Because of the guide rib formed perpendicular to the back rib of the cap door, this is effective during assembly operation allowing easy and quick insertion of the panel door to the cap door.

[0023]

[Embodiment] Hereinafter, the embodiment of the present invention is described with reference to the drawings of Figs. 1 to 5.

[0024] AQF represents a front view of the refrigerator having this door structure. The reference numeral 1 denotes a main body of the refrigerator. The reference numeral 15 denotes a pullout type door structure. Figs. 2 and 3 respectively show the oblique view and cross section of the pullout type door structure 15. The handle unit 19 and the convex unit 20 are designed for "easy hold" and "easy to inset".

hand in the position", and are designed to carry out definite process of the door opening and closing. The door structure 15 includes the upper side cap door 16, the lower side cap door 17, and the panel door 18 held in between both the cap doors. In addition to that, the handle unit 19 is formed at the upper side cap door 16. Together with the convex unit 20, the right and left partition unit 21, and the rear plane rib 22, the box shape handle structure is constituted at the front lower part.

[0025] The drawing of Fig. 4 shows the backside view of the handle unit 19. Referring to Fig. 4, in regard to the right and left partition unit 21 and the rear plane rib 22, since the central area of the handle unit, the right and left partition section, and the rear plane rib are formed in box shape, the handle is easily recognized and it gives a sense of security with firm intensity, without the handle unit bending. The handle unit 19, the convex unit 20, the right and left partition unit 21, the rear plane rib 22, and the roof cap 23 is constituted to box shape.

[0026] The drawing of Fig. 2 shows the oblique view of the door structure 15. Refer to the panel door 18, and note the outwardly protruded portion at its center, which is forming the protruded panel door 24. The cap doors 16 and 17 are also outwardly protruded in the likewise manner as the protruded panel door 24, altogether forming the protrusion at the central areas of the panel door 18 by the protruded panel door 24 and the protruded cap doors 25 and 26. This fact can effectively contribute in allowing an extra thickness of the urethane adiabatic material to reduce the amount of heat absorption and energy consumption is low.

[0027] The drawings of Figs. 2, 3, and 4 show the oblique view of the door structure 15, the vertical section view and the cross-sectional view of the door structure 15, respectively. Referring to Figs. 2, 3, and 4, the concave unit 27 of the frontal plane of a center of the handle unit 19, and the escutcheon 28 constitute it. Effect of improving the external appearance, emphasizing it being the handle unit by having established the concave unit in the handle unit and having constituted escutcheon as another object, and carrying out opening and closing action of a door without holding onto other portions.

[0028] The drawing of Fig. 5 shows a cross section of the essential component of the panel door 18 and the lower side cap door 17. Referring to Fig. 5, the panel door 18 is structurally sandwiched between the front rib 29 and the back rib 30 of the cap door. A seal member is lost by this method of the panel door having the sandwich structure with the front rib of the cap door, for improving the assembly operation. The door structure consists of the front rib 29 of the cap door, and the back rib 30 having a height shorter than the front rib 29.

[0029] The drawing of Fig. 5 shows a cross section of the essential component of the panel door 18 and the lower side cap door 17. Referring to Fig. 5, a guide rib 31 is placed in position at the rear rib 30. The guide rib is formed perpendicular to the back rib of the door cap. It plays the effect of quick and easy assembling operation at the time of insertion of the panel door to the cap door. It is constructed so that guide rib 31 is perpendicular in position to the back rib of the cap door.

[0030] In addition to that, according to the present embodiment so far described, the pullout drawer type door is used to describe the door structure as the example. However, this structure can likewise be

adapted to other doors including the rotating type right and left hinge door and the vertical hinge door, by slightly shifting the position of the handle to obtain the similar effect.

[0031]

[Effect of the Invention] According to claim 1 of the present invention, since the handle unit is projected from the frontal plane facing lower direction, and able to obtain advantageous effects such as easy to inset a hand, easy grasp, and door opening operation is carried out firmly.

[0032] According to claim 2 of the present invention, the box-shape structure constituted at the central handle unit, the right and left partition unit, and the rear plane rib configuration, are effective in providing user with a sense of security upon opening operation brought about by the firm intensity without the handle being bent. Also, it is effective in knowing whereabouts to place the hand.

[0033] According to claim 3 of the present invention, the central portion of the panel door and the central portion of the cap doors have convex shape, this brings about the effects of energy saving and reduction of heat absorption.

[0034] According to claim 4 of the present invention, the concave shape is established at the handle unit, and the escutcheon is constituted as another object. These bring about the effects of improving the external appearance, emphasizing the handle unit, and abolishing opening and closing action of a door while holding onto other portions.

[0035] According to claim 5 of the present invention, the door structure of which the panel door is sandwiched by the front rib and the back rib. This sandwich structure is effective in losing the seal member and hence the improvement in the assembly operation is acquired.

[0036] According to claim 6 of the present invention, the door structure of which the panel door is sandwiched by the front rib and the back rib. In addition to that, the guide rib is formed perpendicular to the rear rib of the cap door. This sandwich structure of the door structure shows its effectiveness during assembly operation because the panel door is easily assembled to the cap door.

[Brief Description of the Drawings]

[Fig. 1] A front view of the refrigerator is showing the door structure of one embodiment of the present invention.

[Fig. 2] An oblique view of the refrigerator is showing the door structure of one embodiment of the present invention.

[Fig. 3] A vertical cross section of the refrigerator is showing the door structure of one embodiment of the present invention.

[Fig. 4] A horizontal cross section of the refrigerator is showing the door structure of one embodiment of the present invention.

[Fig. 5] A vertical cross section of the refrigerator of the essential part is showing the door structure of one embodiment of the present invention.

[Fig. 6] An oblique view of the refrigerator is showing the door structure of the conventional example.

[Fig. 7] An oblique view of the refrigerator is showing the door structure of the conventional example.

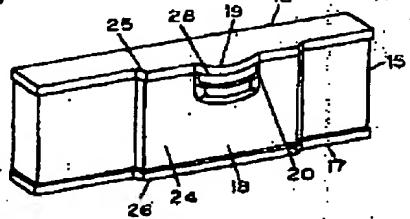
[Fig. 8] A vertical cross section of the refrigerator is showing the door structure of the conventional example.

[Description of the Signs]

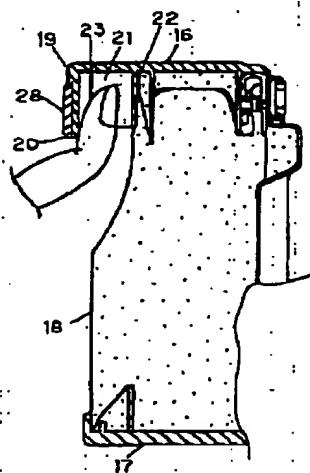
- 1 Main Body of Refrigerator
- 15 Door Structure
- 16 Upper Side Cap Door
- 17 Lower Side Cap Door
- 18 Panel Door
- 19 Handle Unit
- 20 Convex Unit
- 21 Right and Left Partition Unit
- 22 Rear Plane Rib
- 23 Roof Cap Unit
- 24 Protruded Panel Door
- 25 Protruded Upper Side Cap Door
- 26 Protruded Lower Side Cap Door
- 27 Concave Unit
- 28 Escutcheon
- 29 Front Rib
- 30 Back Rib
- 31 Guide Rib

FIG.1  
[図1]

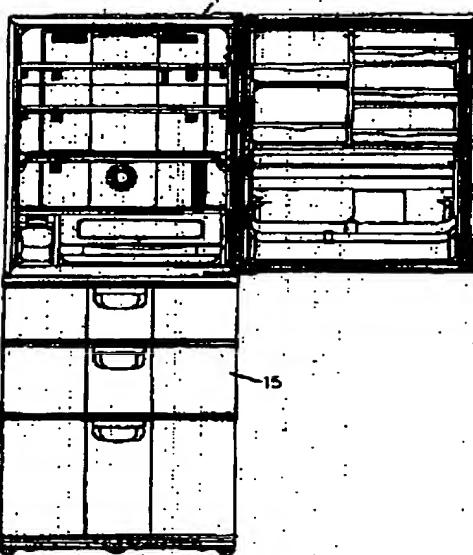
door structure  
upper side cap door  
lower side cap door  
panel door  
handle unit  
concave unit  
protuded panel door  
protuded cap door  
upper side  
protuded lower side  
cap door

FIG.3  
[図3]

upper side cap door  
lower side cap door  
panel door  
handle unit  
concave unit  
protuded panel door  
protuded cap door  
upper side  
protuded lower side  
cap door

FIG.2  
[図2]

1 冷蔵庫本体～ refrigerator  
15 ドア構造体～ door structure

FIG.4  
[図4]

upper side cap door

16 上辺キャップドア  
18 パネルドア～ panel door  
19 ハンドル部～ handle unit  
20 突出部～ concave unit  
21 仕切り部～ partition unit  
22 背面リブ形状～ rear plane rib  
23 天面キャップ部～ roof cap unit  
28 エスカッション～ escutcheon

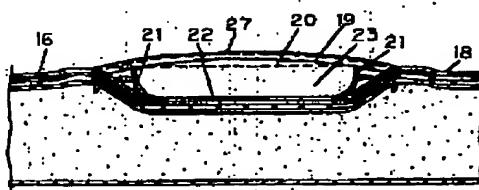
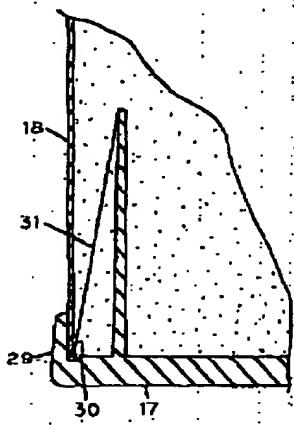
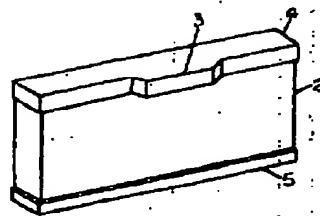
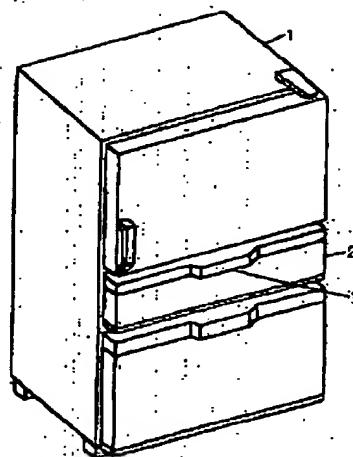


FIG.5  
[図5]

lower side cap door ← 17 下部キャップドア  
 panel door ← 18 パネルドア  
 front rib ← 29 前リブ  
 back rib ← 30 後リブ  
 31 ガイドリブ  
 guide rib

FIG.7  
[図7]FIG.6  
[図6]FIG.8  
[図8]